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VALUE CHAINS FOR NUTRITION IN SOUTH ASIA: WHO DELIVERS, HOW, AND TO WHOM?

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Building Dairy Value Chains in Badakhshan, Afghanistan*

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Abstract Considerable recent research has tried to link agricultural production and the distribution of nutrient-rich foods to consumption, and hence improved health, of nutritionally vulnerable population groups. However, we are still unsure how agri-food value chains can assure positive linkages between agriculture and nutrition. Badakhshan is a remote region of Afghanistan, where high rates of malnutrition prevail among vulnerable population groups. The research reported here is a value chain analysis of a dairy project in Badakhshan that was designed to enhance women's economic development through investments in production, processing, and marketing, but also had considerable potential for nutritional impact. Using primary data from surveys of project participants and non-participants, focus groups, and key informants, I conclude that building effective value chains can leverage dairy production for better human nutrition, but projects need contextualisation, and further research and value chain development are needed to maximise the potential.

Keywords: Afghanistan; dairy sector; value chain development; public–NGO partnership; Afghanistan; nutrition security; vulnerable groups; women's empowerment.

1 Introduction: malnutrition and livestock interventions

Food security is often understood as freedom from hunger, or 'zero hunger' – which, put simply, can be addressed by a diet with adequate amounts of macronutrients, energy and protein. More precisely, the Committee on World Food Security refers to 'access to sufficient, safe and nutritious food', and emphasises that the 'nutritional dimension is integral to the concept of food security' (2009: 1). Likewise, the Sustainable Development Goal 2 (SDG2) 'Zero hunger' is broad, aiming to 'End hunger, achieve food security and improved nutrition and promote sustainable agriculture' (United Nations 2017: 1). However, it is useful to reserve the term 'nutrition insecurity' for deficiencies of micronutrients – vitamins and minerals – which are principal causes of stunting of children, insufficient growth, and reproductive performance of adolescents, in particular girls, and of pregnant and lactating women, and which are one cause of the increasing global levels of non-communicable diseases.

Nutrition insecurity can be addressed, *inter alia*, by a range of policy actions and interventions that deliver micronutrient-rich foods to nutritionally vulnerable population groups. Increasing dietary diversity, meaning the consumption of a wider range of foods which include micronutrients, is one significant approach to enhance nutrition security. These foods include fruits, vegetables, and nuts, and a wide range of animal source foods. Access to micronutrient-rich foods can be achieved through a variety of pathways such as crop and livestock production and consumption, improved incomes enabling purchases of nutrient-rich foods from markets, social and supplementary feeding programmes, and local and massive nutrient supplementation programmes.

The last few years have witnessed a surge of interest in understanding agriculture–nutrition linkages, and shaping agriculture and food sector initiatives to improve nutrition security (Dangour *et al.* 2012). Summing up the view of a High Level Panel of Experts, the Food and Agriculture Organization of the United Nations (FAO) reports that ‘the sustainable development of agriculture, including livestock, is essential for poverty reduction and the achievement of food security and nutrition’ (Committee on World Food Security 2016).

However, with reference to the commonly accepted ‘pillars’ of food security (Committee on World Food Security 2009), ‘availability’ of nutrient-rich foods does not automatically ensure ‘access’, ‘affordability’, and ‘stability’ of supply and consumption by vulnerable population groups. Agricultural produce of higher nutritional quality may be sold and substituted in the diet by poorer foodstuffs bought with cash. Increased incomes may also be diverted towards non-food consumption. Thus, there is no assurance that nutritious home produce will be consumed by vulnerable women and children, or in sufficient quantities to effect improvements in nutrition and health (Maestre, Poole and Henson 2017). In such circumstances, access to, and forms of engagement with, food markets become important. Research increasingly points beyond agricultural production to the role of markets as a source of nutritious foodstuffs, even among rural peoples (Sibhatu, Krishna and Qaim 2015; Flores-Martínez *et al.* 2016; Sibhatu and Qaim 2017).

1.1 Dairy value chains and nutrition in Afghanistan

This article is about agri-food value chain development, and assesses the extent to which the dairy sector can contribute to improvements in nutrition security. The focus is on Badakhshan, a north-eastern mountainous province of Afghanistan (Figure 1). It captures three important themes embedded in the UK Aid-funded research consortium programme Leveraging Agriculture for Nutrition in South Asia (LANSA): fragility, gender, and innovation. The region is characterised by fragility in terms of climatic extremes and natural resources constraints and in terms of the ongoing conflict which affects much of the country. In this traditional social environment, women have a significant role in agriculture and dairy in particular, but gender equality and women’s empowerment are major issues (Boros and McLeod 2015;

Figure 1 Badakhshan, Afghanistan

Source Author's own.

Ministry of Agriculture, Irrigation and Livestock 2015a, 2015b). Developing new ways of dairy value chain organisation are inherent in the initiative (Glover 2017; Gupte 2017).

After this introduction, the article proceeds in three main sections. Section 2 explains the Afghan context regarding nutrition and the prevailing mode of implementation of public policies, which, because of the limited capacity of the state, is through national and international non-governmental organisations. Section 3 introduces the women's economic empowerment (WEE) project implemented in Badakhshan by the UK non-governmental organisation (NGO) Afghanaid and explores the findings of a review specifically of the dairy sector interventions. Section 4 is the major part of the analysis, which considers the development of the dairy value chains in relation to the LANSa value chain framework (Maestre *et al.* 2017). It explains the methods, maps the value chains, presents the findings, provides an assessment of the development of the dairy sector in Badakhshan, and comments on the limitations of the analysis and needs for further research. Finally, the conclusions in Section 5 suggest ways ahead to maximise the pro-nutrition impact of dairy value chain development.

2 The Afghan context

LANSa has been working in South Asia since 2012. In Afghanistan, one of the four target countries, undernutrition is evidenced by high rates of stunting, wasting, micronutrient deficiencies, and anaemia. The national rate of stunting was recorded in the latest National Nutrition Survey 2013 as 40.1 per cent. Nevertheless, in some of the 34 provinces, rates still exceed 70 per cent, and even within provinces, there is considerable variation in health indicators between districts. The survey investigated a

number of micronutrient deficiencies and found that anaemia (Hb levels <11.99gm/dl) affected 40.4 per cent of women of reproductive age (15–49 years), with 24.0 per cent suffering iron deficiency and 13.8 per cent suffering iron-deficiency anaemia. Anaemia among children 0–59 months of age remains persistently high at 44.9 per cent, with 26.1 per cent suffering from iron deficiency and 13.7 per cent suffering from iron-deficiency anaemia (UNICEF 2014). Badakhshan, a remote and mountainous north-eastern province subject to climatic extremes and natural disasters, is one of the provinces most affected.

In reality, Afghan food and nutritional security policies are heavy on therapeutic interventions, behavioural change, and market supports (Poole, Echavez and Rowland 2016). Ten years ago, Johnecheck and Holland (2007) envisaged a multisectoral approach to improving malnutrition in Afghanistan, while various other research outcomes have identified gaps between the agricultural and nutrition sectors, and highlighted the significance of food-based approaches to improving nutrition (Levitt, Pelletier and Pell 2009a; Levitt *et al.* 2009b; Levitt *et al.* 2010; Levitt *et al.* 2011). Nevertheless, current policies do not emphasise the role of agriculture and food-based strategies for improving nutrition.

2.1 Modes of intervention

As with many areas of public services in Afghanistan, project interventions are undertaken through partnerships between the public sector and implementing organisations which are often NGOs such as Afghanaid. This public–NGO (PUNGO) modality redresses the limited capacities of the public sector in terms of human and financial resources and access to remote communities (Newbrander *et al.* 2014; Varkey *et al.* 2015). For a resource-poor and conflict-ridden country, the PUNGO partnership approach is a workable solution and is no less sustainable than other forms of governance: Afghanaid has been supporting development since 1983. In the livestock sector, the 25-year plus history of the Dutch Committee for Afghanistan (DCA) in Afghanistan is also illustrative of such long-term commitment (Schreuder 2015).

Recent work undertaken by Afghanaid is one example of interventions designed to enhance the role of women in economic development – but not specifically nutrition. Women's economic empowerment in Afghanistan is necessary but probably under-recorded. Maybe only 20 per cent of adult women are engaged in the formal economy, but women's contribution to certain sectors such as horticulture and livestock husbandry is significant. The dairy production sector is one in which female participation is high, with a range of potential benefits for women in terms of income, employment, and empowerment. For rural households, dairy has potential to increase the nutritional status of vulnerable groups: children, adolescent girls, and women. In Afghanistan, dairy consumption is constrained by lack of product volume, inefficient value addition by processing, weak marketing, and limited distribution. Seasonality also is a major constraint to domestic supply, which is supplemented by imports from neighbouring countries (Boros and McLeod 2015; Safi 2016).

3 Women's economic empowerment in Badakhshan

Integrated dairy schemes in Kabul, Balkh, Kunduz, and Herat have been supported by the FAO since 2005 with financial support from the national government, bilateral donors (German and Italian governments) and the UN International Fund for Agricultural Development (IFAD). A recent study of the initiatives focused on four of the five existing schemes, located in Kabul, Balkh, Kunduz, and Herat, the other project being a newer initiative in Jalalabad. The state of the dairy sector in Afghanistan has been summarised by Boros and McLeod:

The dairy sector is at an early stage of development. Most producers are small farmers scattered across villages with some larger ones concentrated in peri-urban markets. Imports from the Islamic Republic of Iran (especially in the western part of the country) and Pakistan account for a large part of the supply of dairy products and seem set to increase rapidly. Milk is imported mainly in the form of milk powder and the rest as ultra-high temperature (UHT) products. UHT products are more widely sold than fresh milk as they have a long shelf-life and are less dependent on refrigeration. They are twice as expensive as those produced locally with fresh milk from farms (2015: 6).

The first stage of a Women's Economic Empowerment (WEE1) project financed by DFID was implemented by Afghanaid between 2013 and 2016 (Afghanaid 2016). The WEE1 project in Badakhshan Province is one example of a number of value chain interventions implemented within Afghanistan. The aim was to enhance women's inclusion, incomes, and employment by delivering technical training in rural production, provision of physical inputs, training in entrepreneurship and leadership skills, establishing community-based organisations (CBOs), and building product processing capacity and marketing networks. The dairy sector was one of those specifically targeted by the value chain development interventions. Nevertheless, WEE1 was not designed specifically to address nutritional deficiencies. The goal of WEE2 funded by the UK Foreign and Commonwealth Office through the British Embassy in Kabul was to strengthen the sustainability of the women-led CBOs in target areas of Badakhshan, consolidate their income gains, and deepen women's economic and social empowerment.

3.1 The dairy sector contribution

The second stage began with a baseline study of rural households in June 2016. This had three aims: to evaluate gender equality and status issues affecting women's participation in income generation and decision-making; to assess women's participation in community leadership and governance; and specifically, to investigate the dairy production sector and food consumption.

A total of 562 women were interviewed. Fifty-one per cent of them (287) had been directly involved in the implementation of the WEE1 project and 49 per cent (275) were randomly selected control group

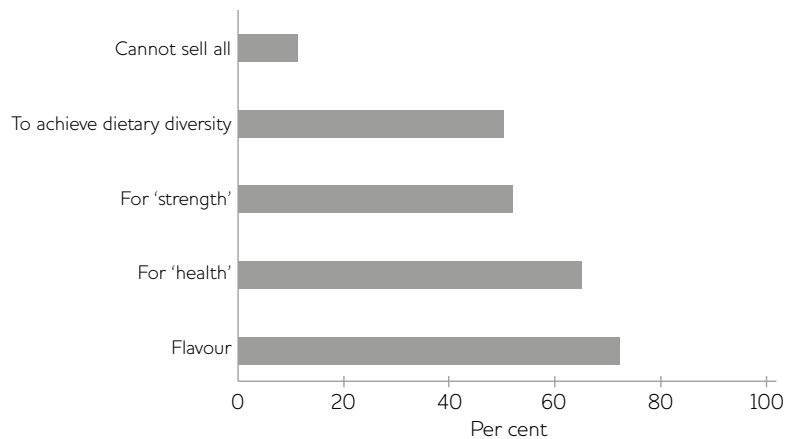
Table 1 Sources of dairy products consumed within households

		WEE participants %	Non-WEE participants %	Total %
Own production	Milk	70.4	56.4	63.5
	Milk products	57.1	41.1	49.3
Purchase	Milk	16.7	24.0	20.3
	Milk products	12.9	13.5	13.2
Exchange with relative/ neighbour	Milk	16.0	16.4	16.2
	Milk products	6.3	7.6	6.9
Gifts from relative/ neighbour	Milk	11.5	10.9	11.2
	Milk products	10.1	2.9	6.6

Source Afghanaid (2016).

members without any previous involvement. Baseline findings showed that the income of female-headed households was significantly lower than that of male-headed households, and that in half of households, income-generating activities were shared between men and women. Women's economic activities were related to home garden vegetable and fruit production, and poultry and dairy production, mostly for household consumption. About 10 per cent of women were not engaged in income-generating activities. Income generation was found to contribute to women's self-esteem. Respondents who engaged in commercial activities tended to sell to neighbours and to local markets rather than more distant district and provincial markets, and on an individual rather than collective basis.

The findings on dairy showed that household diets were dominated by bread, rice, oil, tea, and leafy vegetables, but consumption of dairy products was the next most important food category. Dairy products were sourced either from own production or purchased, and were consumed by more than 96 per cent of respondents' households. For those who had been involved in the WEE1 project, dairy constituted the principal source of income for 34.6 per cent of households, compared to 18 per cent for households that did not participate in the project. The frequency of dairy consumption for most households was daily (87 per cent), while 8 per cent consumed dairy a few times a week, and just over 1 per cent said that they never consumed dairy products. For the whole sample, among children, 78 per cent of daughters and 80 per cent of sons consumed dairy products, and female household members consumed (53 per cent) more than men (47 per cent). In cases where milk was not distributed equally, preference was given to children. WEE participants were significantly more likely to consume dairy products than the control group who had not participated in previous empowerment activities, as is evident in Table 1.

Figure 2 Reasons for dairy product consumption

Source Author's own, redrawn from Afghanaid (2016).

The study showed that women in the household were the members most likely to be responsible for milk production, and even more so among project participants than non-participants. Fewer than 10 per cent of adult men were responsible for dairying. Either as the wife of the head of householder/livestock owner, or as the person responsible for caring and milking the livestock, they also exercised decision-making responsibility for the distribution of milk within the household. Women were also the major beneficiaries of income from sales of dairy products. Income was spent mostly on daily household expenses (95 per cent of the whole sample), followed by school expenses (57 per cent) and health care (32 per cent).

Not surprisingly, a marked seasonality of production was recorded, with milk supply and income from dairy products peaking in the spring and summer months. Milk volumes were small, on average about three litres in the summer, with a maximum of 16 litres registered within the project participant group. In the winter months, the small supply of milk was mainly consumed rather than sold. Respondents' reasons for consuming dairy products were a mix of reasons including some awareness of the nutritional value (Figure 2).

In summary, dairy production was shown to be an important enterprise which can be boosted by interventions such as the WEE project. Dairy products make an important dietary and economic contribution to households, and to children in particular. Dairy production and consumption is a defining characteristic of women's role and empowerment. However, more remains to be discovered about the potential for dairy to contribute to household wellbeing and nutrition on a larger scale, viz.:

- Dietary contribution: the volumes of milk collected and consumed were small, and it is not clear what effective contribution the

consumption of dairy products actually makes to diets, which is a function of quantities as well as frequencies.

- Product development: observational data and reports from key informants indicated that household milk supplies were considered as a single product: milk from cows, sheep, and goats was not separated, but mixed. Little is known of the type of dairy products; processing and storage activities; and patterns of commercialisation of such products as cheeses and yogurts derived from milk. Thus, there was a need for a more detailed value chain study to explore the potential for greater value addition through product preservation, differentiation and branding, product quality control and marketing, and chain governance.
- Spatial issues in the dairy sector: the milk markets into which the dairy women are linked are mainly local. More remains to be understood about consumption of dairy products in rural areas by households that are not directly engaged in dairy production. Moreover, there are as yet no data on dairy product consumption in urban areas.
- Seasonality: finally, production is highly seasonal, but it is not known precisely how seasonality affects variability in consumption and prices, nor how seasonality of local production interrelates with milk imported from outside the region, and the potential for processing milk to exploit the season of low production and availability.

4 WEE dairy value chain analysis

The rest of this article concerns a dairy value chain analysis undertaken from July 2016–March 2017 as part of WEE2 following the interventions to strengthen women's economic participation through empowerment of women-led CBOs for production and savings, targeting more than 8,000 members. The project worked in eight districts of Badakhshan, establishing and training 88 women's dairy production groups, 16 milk collection centres (MCCs) and eight dairy processing centres (DPCs), aiming to attract 200–500 litres per day, depending on the season, to each centre for processing into other dairy products and for commercial distribution. WEE project participants received training on a range of technical topics including feed preparation. During 2015, Afghanaid equipped 16 MCCs with essential milk handling and bulking equipment and materials. Milk processing equipment and materials were provided to each DPC for milk chilling, pasteurisation, processing of derived products, hygiene, and quality control. Para-veterinarians who had been trained by DCA in each of the targeted districts provided guidance on livestock management, health and epidemiology, and vaccination services. Many WEE participants acknowledged the benefits from upgraded knowledge and skills through giving positive responses to several technical and non-technical questions about livestock keeping such as hygiene, diseases, and vaccination.

The value chain analysis was conducted by an independent analyst to assess the impact of the WEE intervention and the constraints to boosting the dairy sector (Safi 2016), specifically to:

- a Identify the main players and linkages in the dairy value chain;
- b Evaluate the competitive advantages/disadvantages of the value chain players (market access, technology/product development, management/organisation, input supply/raw materials);
- c Assess the sector institutional environment (finance, policy, operating environment/infrastructure, trade regime);
- d Identify the main opportunities for value addition for women-led CBOs; and
- e Identify the main constraints faced by the value chain members.

4.1 Analytical framework

4.1.1 Availability of nutrient-rich foods

This article focuses on how value chain investment enhanced the ‘availability’ pillar of food security (Committee on World Food Security 2009). Further work is being undertaken to assess the dairy consumption characteristics within the wider population to examine the extent to which interventions improve the ‘affordability, utilisation and stability’ pillars in relation to seasonal extremes affecting the dairy sector in Badakhshan.

The concepts proposed by Maestre *et al.* (2017) are used here to frame the results of the value chain study. The study provided evidence concerning the second pathway by which value chain interventions can impact human nutrition, viz. by increasing the production and distribution of dairy products. Afghanistan has agricultural development strategies to boost the livestock sector. However, as noted, agri-business policies have not historically been formulated to address nutrition objectives, and LANSAs envisages realignment of multisectoral objectives to reduce the high rate of malnutrition.

From a public perspective, milk and derived products are naturally nutritious foods that can do much to enrich a micronutrient-deficient diet. From a private perspective, the attractiveness of the sector for the individual firm in the value chain post-farmgate depends on three elements:

- In the first place, there is the nature of sector competition and each firm’s own business strategy in creating and sustaining performance, both economic and, to the extent to which consumer demand exists, in relation to social parameters such as employment creation and inclusion of women, and environmental management.
- Secondly, the industry attractiveness is also shaped by supporting and regulatory functions which facilitate business development, such as financial services, the provision of infrastructure and energy, business regulation and, in the case of dairy (and other foodstuffs), a quality framework for ensuring product safety.

- Thirdly, from a public nutrition perspective, an efficient system of product distribution is critical to ensuring the availability of products to nutritionally vulnerable consumers.

Within this institutional environment, Maestre *et al.* (2017) frame these business concerns under four requirements for there to be 'availability' of naturally nutritious foods to vulnerable consumers:

- a the extent to which a value chain enables firms to add value;
- b an equitable sharing of incentives throughout the chain;
- c the efficient governance of inter-firm relations; and
- d the management of costs and risks.

4.2 Methods

4.2.1 Secondary data

Several socioeconomic and feasibility studies conducted by Afghanaid in Badakhshan were an important source of secondary data. Other documents were published reports of donor-funded development projects that were previously implemented or currently being implemented in Badakhshan Province; for instance, by FAO, the German organisation for international development, GIZ, and the Aga Khan Foundation. This dairy value chain assessment report relies largely on primary data from field research.

4.2.2 Primary data

Primary data collection was conducted among chain actors from input suppliers to retailers, through focus group discussions and interviews with representatives of CBOs, MCCs, and DPCs, and with key stakeholders of the dairy sector in Badakhshan Province. The latter included local representatives of the Department of Agriculture, Irrigation and Livestock (DAIL), the Department of Women's Affairs (DoWA), representatives of the provincial governor, and NGOs working in the dairy sector.

A questionnaire was designed for milk producers concentrating on aspects of milk production, supply to the market, required inputs, and challenges. Implementation targeted about 40 producers sampled from members of WEE groups and non-WEE dairy producers from eight districts of Badakhshan (Argo, Baharak, Darayem, Faizabad, Jurm, Kishem, Shuhada, and Yaftal). In total, 139 respondents were interviewed including producers, respondents from MCCs, DPCs, transporters, retailers, and other stakeholders (Table 2). A key issue was the comparison between dairy producers who benefited directly from the WEE intervention, and the non-WEE producers.

A focus group discussion was held in each district including representatives of CBOs, MCCs, and DPCs. Questions focused on factors assuring sustainability of existing dairy groups. Participants of the focus group discussion were key players, active beneficiaries, and

Table 2 Sample framework

Respondents/region	Argo	Baharak	Darayem	Faizabad	Jurm	Kishem	Shuhada	Yaftal	Total
Input suppliers	1	1		1	1	1			5
WEE dairy producers	3	3	3	3	3	3	3	3	24
Non-WEE dairy producers	2	2	2	2	2	2	2	2	16
Retailers	2	2	2	2	2	2	2	2	16
Representatives of MCCs (FGD)	2	2	2	2	2	2	2	2	16
Representatives of DPCs (FGD)	2	2	2	2	2	2	2	2	16
Representatives of MCCs (IND)	2	2	2	2	2	2	2	2	16
Representatives of DPCs (IND)	2	2	2	2	2	2	2	2	16
DAIL		1		1		1			3
DoWA		1		1		1			3
Governor's office		1		1		1			3
GLZ official				1					1
Afghanaid provincial programme manager				1					1
Afghanaid – WEE coordinators				2					2
Afghanistan Chamber of Commerce and industry official				1					1
Total									139

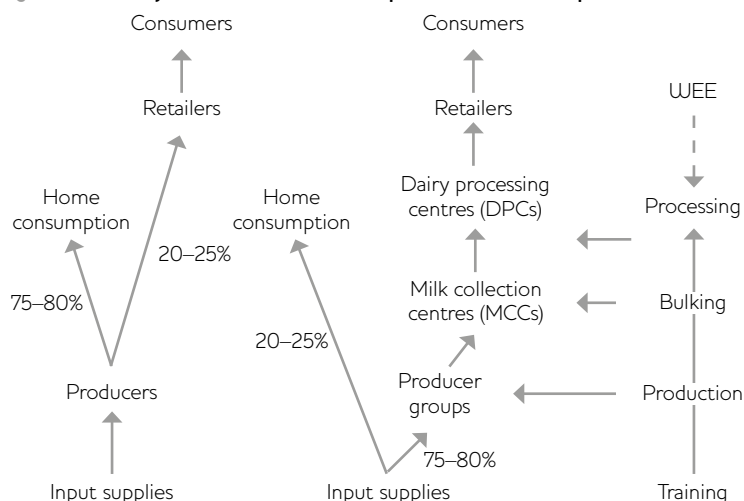
Note FGD = focus group discussion; IND = individual interview.

Source Adapted from Safi (2016).

experienced dairy sector experts; therefore, it was essential to collect their ideas in the initial stage of the assessment.

4.3 Findings: the dairy value chains

The formal structure of the dairy system is simple. Service providers in the form of feed and animal health inputs, transport, and hygiene controls support the chain from input supply to end consumer. The system comprises two chains, each consisting of the following main actors: input suppliers, producer groups, MCCs, DPCs, retailers, and consumers. The principal differences between the two chains shown in Figure 3 are the simpler structure of the chain and the small volumes estimated to flow to commercial outlets from non-WEE producers (20–25 per cent), compared to the WEE producers' chain (75–80 per cent).

Figure 3 The dairy value chains: non-WEE producers and WEE producers

Source Adapted from Safi (2016).

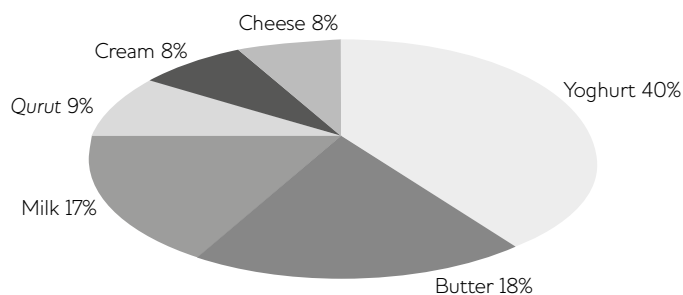
Value addition includes all necessary processes of milk conversion to other dairy products by boiling/pasteurisation, cooling, packaging, and ultimately producing and supplying various dairy products to the market. National data for demand for various dairy products is shown in Figure 4.

4.3.1 Production and productivity constraints

The common type of cow is the *watani* or *kunari* cow, estimated to produce up to three litres of milk per day during a lactation period of ten months, giving about 850 litres per lactation period. Mostly, households keep one or two cows. Because cows also suckle calves, only 20 per cent of respondents were occasionally supplying two or more litres of milk either to retail shops or MCCs. While the total milk production of WEE producers was considerably lower than the total capacity of the MCCs, the total production of each district was estimated to be several times higher than the total capacity of the MCCs in each district. The traditional spring calving period coincides with the better availability of fresh fodder, and more milk can be collected than the local plants can manage. In winter, there is a shortage of milk, as many cows are dry and feed is scarce.

The initial stages of production and processing are performed by the women, up to the engagement in markets. Livestock keeping is a significant activity for women producers because keeping livestock helps to eliminate fuel and fertiliser costs by producing dung. It also helps reduce family food expenditure by producing fresh milk and other dairy products, and is an important source of income.

Besides extreme seasonality of production, limitation in supplies was attributed to the traditional nature of Afghan markets and society, and the constraints that this imposes on women's engagement in economic activities. While dairy is a 'women's' enterprise, their participation in

Figure 4 The national market for dairy products

Source Adapted from Boros and McLeod (2015).

sales and exchange of dairy products for other goods was restricted to within local communities.

4.3.2 Milk collection centres

There was evidence that women tended to deliver milk to small local retail outlets and make local sales. However, transportation is a major challenge due to the bad road connectivity, insecurity, and long distances, physical conditions which exacerbate the customary social restrictions affecting women. Poor logistics also compound the short product shelf life.

Two MCCs were established in each targeted district and were equipped for milk collection. Each functioning centre was managed by three to four women. However, only eight of the 16 MCCs were activated: two in each of the four districts of Baharak, Jurm, Shuhada, and Yaftal. Other districts – Faizabad, Darayem, Argo, and Kishem – were yet to re-activate and operationalise the MCCs and DPCs.

The total milk production of WEE producers was considerably lower than the total capacity of the MCCs. Most households in the rural region kept cows and thus the local demand for milk and yogurt from retail shops or neighbours was limited. Supplies reached a peak in spring and summer, and it was outside these seasons when processing capacity was least utilised. Besides production and productivity-enhancing activities, value chain development opportunities at the MCC level included human capacity building among producers to take advantage of efficiencies of scale and provision for better horizontal and vertical coordination to exploit the capacity of the new formal sector.

There was potential to expand sourcing by women's associations through establishing links between non-WEE producers and the MCCs to satisfy the DPCs' processing capacity, and to meet the urban demand for milk and yogurt in the targeted markets of Faizabad, Baharak, and Kishem.

4.3.3 Dairy processing centres

Each district had its own DPC equipped to handle a capacity of 1,000 litres/day. Each centre was operated by four to five women who provided technical managerial services. These centres were equipped

to process raw milk into several types of local dairy products such as yogurt, cheese, *qurut*, cream, and butter. *Qurut*, a processed yogurt curd, is often dried and is valuable because of its long shelf life.

As noted, seasonality of milk production affects supply to DPCs and hence the potential mix of products. Every DPC was equipped with transport facilities to collect milk from producers and MCCs at district level. The processed products were delivered in bulk loads of 300–350kg from DPCs to the market, and transport costs and ease depended on the quality of roads. Major markets were Faizabad, Baharak, and Kishem, three districts with significant urban populations where multiple retailers purchased and sold different types of packaged and non-packaged products in competition with national and imported products. It was evident that more sophisticated product development and marketing initiatives at DPC level would be required to capture market share.

As noted, sales and delivery to MCCs and to DPCs were a male responsibility, and men were thus responsible for vertical coordination between the stages. Non-WEE producers were a potential source of supplies for MCCs and DPCs to address capacity issues. Inconsistency due to the seasonality of production was a feature of milk supplies to the local market and to urban markets, and needs to be better understood in terms of prices and demand, in order to evaluate the nutritional impact of fluctuating supplies as well as the efficiency implications for processing. Stakeholders and beneficiaries believed that milk collection could reach the maximum of 8,000 litres per day in the eight districts if middlemen in each district were encouraged or employed to regularly visit women producers (WEE groups and non-WEE producers), organise them, and collect milk from every group every morning and evening.

Respondents commented that lack of electricity, input supplies, and advanced technologies were major factors at macro and micro level that require governmental support.

4.3.4 Consumption

There were three customer segments identified in Faizabad market. The first was customers who were price-sensitive: about half of the customers, as expected, pointed to the high prices as one of the important factors in consumption decisions. Others were quality-sensitive, who wanted only high-quality dairy products, and showed little price sensitivity. A third segment was of potentially loyal customers of local production, but who were currently purchasing imported products due to lack of awareness and local availability.

The retailer survey found no wholesaler in Faizabad as well as in targeted districts willing to purchase high volumes of dairy products. Sales were largely through small retail shopkeepers and roadside vendors who purchased small quantities of fresh milk and yogurt from local producers and processors. Other dairy products were imported Iranian

products such as cheese, butter, cream, and *qurut* that were supplied from Kunduz to Badakhshan. On a daily basis, retailers sold about 30–35kg of yogurt and milk, 0.5kg of butter, followed by cream and *qurut*. During interviews, retailers in the Faizabad provincial market expressed interest in visiting DPCs, negotiating prices and contracts for specific quantities of dairy products. It was evident that weak processing and commercial activities of domestic enterprises facilitated access by neighbouring countries to the market, allegedly supplying low-quality products.

4.4 Assessment

The FAO study cited earlier makes clear that the dairy sector is at an early stage of development, but also that there is potential to increase both domestic supply and demand (Boros and McLeod 2015). The potential impact on women's empowerment is evident, particularly because dairying is one of the few commercial activities that is viable in remote regions of the country.

The marked seasonality to production and supply to markets has been noted, and also that yogurt is important as a major component of sales, followed by butter, raw milk, and a series of other derived products: cheeses, *qurut*, and cream. The constraints to realising the potential to address some of the national nutritional insufficiencies can be interpreted using the data from the value chain analysis and the framework proposed by Maestre *et al.* (2017).

The production and distribution of nutrient-rich foods such as dairy products is one pathway by which agricultural value chains can impact consumer target groups such as children, adolescent girls, and women – the LANSa target group. With reference to the concepts proposed by Maestre *et al.* (2017) and highlighted in Section 4.1, the results suggest the following:

- 1 Sector attractiveness: it is evident that the WEE intervention offered a business opportunity, the attractiveness of which is the foundational element for value chain development. Investment in human and physical assets through improving inputs, training, and creation of MCCs and DPCs enabled WEE participants (compared to non-WEE participants) to deliver much increased volumes of milk to MCCs, and onwards DPCs, boosting the supply to market of milk and dairy products in the pilot districts of Badakhshan.

Women's inclusion in the dairy chain was primarily at the production stage, except for employment opportunities in the MCCs and DPCs and in some districts such as Yaftal, where some women sold their products in the market. The more market-related functions were a male responsibility, consistent with the prevailing sociocultural norms.

The attractiveness of the sector is not yet fully demonstrated. Potential for development remained. Constraints to development existed due to the lack of horizontal coordination for bulking milk supplies at the level of production, and the lack of vertical

coordination to DPCs and onwards to consumer markets. To exploit the processing capacity of the infrastructure and market opportunities, more traders or middlemen were needed. The need for further investment in organisational capacity building was also identified. All these factors condition the extent to which the dairy value chains can have a positive impact on nutrition.

- 2 Supporting and regulatory functions: investment in transport and communications infrastructure is a huge challenge in remote regions such as Badakhshan: poor roads, uncertain electricity, and limited knowledge and communications systems increase processing, transport, and information costs. Quality management and hygiene control were found to be compromised and poor packaging was a major gap.

Similarly, competition with imported products from neighbouring countries that are backed by more sophisticated export marketing strategies needs to be addressed. Further development of products is needed in response to demand for appropriately packaged and efficiently distributed goods at prices that are attractive to consumers. Addressing these weaknesses will be a significant business challenge.

- 3 Distribution to nutritionally vulnerable consumers remains another challenge. Delivery of quantities to meet the demand in existing markets will require a major upscaling of milk production and dairy processing capacity, including new product development. This must be accompanied by an increase in sophistication in vertical coordination through the value chain up to the retail level. The propensity of WEE producers to commercialise suggests that supply will be forthcoming. However, sales of milk by poor families might compromise their own diets and nutritional needs.

Regarding the four requirements to encourage individual dairy chain participants to engage in collective enterprises:

- a The fundamental potential to add value from dairy production through processing and marketing to consumption is not in question. Processing capacity could be increased as per market demand, subject to existing producers' commitment to expand milk supply, attracting new suppliers and finance to make the necessary investments. Much more needs to be learnt about the characteristics of demand for different products in order to formulate appropriate marketing strategies, viz. price, product type, packaging and presentation, and distribution systems – particularly how best to address the requirements of nutritionally vulnerable consumers. Uptake of dairy products through schools, clinics, and other public institutions is one market access route that could be explored.
- b To build a successful value chain, it is necessary to ensure an equitable sharing of incentives throughout the chain and this would require innovation in both economic and social organisation: more

- labour input would be required of the dairy producers in order to scale up production, which would likely create tensions and trade-offs with women's other activities and responsibilities. The extra investment by women would have to be rewarded by financial returns commensurate with the production effort invested. An increasing acceptance of women's employment creation would shape an industry environment beyond the farmgate, and boost women's participation in the economy and women's role in providing for their households in nutritional and economic terms. These changes would affect household economics and decisions in challenging ways.
- c The requirement for efficient governance of inter-firm relations has not yet been addressed: further investment is needed in human and organisational capacity building in order to build enterprise scale throughout the chain to achieve efficient businesses and meet nutritional objectives for consumers. Traditional gender roles may constrain cooperation at different levels of the chains, and vertical coordination of the different stages, and even opportunities for training in both basic education and entrepreneurship.
 - d The management of costs and risks requires further careful examination. Public utilities are weak in Badakhshan and require significant investment in energy and communications; information and transport infrastructure are unreliable; and the region is subject to climatic extremes and natural disasters, such as earthquakes, floods, and landslides. Such significant risks, and those market and other risks inherent to dairy business activities are likely to be unequally shared among value chain participants, but can be identified and managed through training and capacity building, and creation and sharing of market information. Above all, a basic public good, which is the security situation, is affected by the encroaching insurgency by non-state armed groups and is currently beyond the capacity of the national government alone to ameliorate.

4.5 Limitations and further research

Any research in Afghanistan is limited by the restrictions on empirical data collection imposed by the current situation of insecurity. This leaves an ongoing research agenda. One area for further analysis beyond what has been achieved in the current assessment is to develop the rudimentary cost-benefit analysis undertaken by Safi (2016), not reported here, with accurate and quantitative data representative of all districts on prices, costs, margins, and profitability of the different value chain functions. This is necessary for an assessment of the sharing of incentives among the range of actors throughout the chain, and therefore the attractiveness of the sector for private enterprise.

Secondly, enhancing the nutritional impact of dairy value chain development requires matching food availability and access to consumer demand by poor and nutritionally vulnerable population groups for dairy products, within a better understanding of diets in Badakhshan

overall. A particular focus is the impacts of production seasonality on dietary sufficiency and hence nutritional security (Zanello, Shankar and Poole 2017). LANSAs work with Afghanistanaid has already begun in Badakhshan to address this second consumption dimension.

Finally, it is essential to understand the pre-existing social environment: '... systems of social bonds and trans-border ethnic, familial and/or political connections [which] are based on trust and are deeply engrained in livelihoods; they are, in practice, the primary systems that regulate and govern rural markets' (Minoia, Mumtaz and Pain 2014: 1). They have been described in terms of 'agri-mafia' (Poole *et al.* 2016), characterised by strong social structures and specific patterns of behaviour, caste, ethnicity, and age, requiring carefully designed interventions specific to particular locations (Mallett and Pain 2017).

5 Conclusions

There are ways ahead for building the dairy chains. The comparison of WEE participants with non-participants shows that dairy interventions to add value through improving production, milk collection, processing, and distribution are effective. However, the WEE interventions are a 'work in progress' that is likely to require ongoing support. Limited resources restrict Afghanistanaid from directly covering additional districts of Badakhshan, whereas further support is needed to improve milk collection, transport facilities, and distribution by linking traders with the MCCs and DPCs. While the principal opportunity to expand is to attract supplies from producers who have not yet participated in the dairy development programme, the principal challenge is to build efficient structures and stimulate effective strategies for effective value chain coordination. Quality control also requires further investment, and another potential opportunity is to develop local product branding. The LANSAs framework (Maestre *et al.* 2017) is an important reminder that business attractiveness is a condition for independent private firms to develop.

Project sustainability is a challenge in Afghanistan more than in many other countries, and value chain development can take many years (Donovan and Poole 2013; Poole and Donovan 2014). Given the ongoing weaknesses of the state, the public sector–NGO (PUNGO) modality of intervention to build local enterprise, and profitable and efficient value chains currently is the only effective approach to overcome the limiting constraints. Among key informants, the director of the provincial DoWA commented that the WEE programme should be expanded to other districts of Badakhshan Province. Respondents from DAIL and DoWA indicated during interviews that they would support financing initiatives from several sources such as credit by public and private banks. DAIL would support market extension initiatives, to provide technical support and training, and also would seek further support from national and international donors and funding organisations. DoWA could support strengthening women's empowerment and organisation building (Safi 2016).

Given time, the dairy value chain model could also be adopted by the private sector in cooperation with regional stakeholders and the public sector, not only in Badakhshan but in other provinces such as Bamyan, and other regions and countries characterised by similar nutritional vulnerabilities and underdeveloped production and market opportunities. The opportunities for dairy to contribute to nutritional security are more or less global. However, Badakhshan is an unusual region: contextualisation which recognises diversity and locality rather than a blueprint approach is essential. Value chain interventions promoted by public sector policymakers and implemented by NGO practitioners, with the intention of stimulating better nutrition through long-term private sector development, should build on local knowledge and specificities, with the onus of responsibility for planning and implementation on the local structures rather than central decision-making (Poole 2017).

Notes

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- 1 The author wishes to acknowledge the encouragement of Afghanaid to analyse the dairy value chain, and for permission to use data collected to evaluate the work in Badakhshan on women's economic empowerment; thanks also to Afghanaid staff for critical comments and to enumerators, interviewees, and respondents who contributed to the fieldwork.

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